

# Science Toolkit: Grade 5 Objective 2.A.2.a

Standard 2.0 Earth/Space Science

Topic A. Materials and Processes That Shape A Planet

Indicator 2. Cite and describe the processes that cause rapid or slow changes in Earth's surface.

Objective a. Identify and describe events such as tornadoes, hurricanes, volcanic eruptions, earthquakes, and flooding which change surface features rapidly.

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## Introduction

### Science Grade 5 Standard 2

In Earth/Space science, students use the skills and processes of science to develop a sense of the context of place, time and physical interactions in which their lives occur. In thinking about what students should learn in astronomy, at least three aspects of the current scientific view were taken into account: (1) the composition of the cosmos and its scale of space and time; (2) the principles on which the universe seems to operate; and (3) how the modern view of the universe emerged. In the early and intermediate elementary grades, students observe objects in the sky and describe changes in these objects, such as apparent size or position. Through continued observation and research, they begin to develop an inventory demonstrating knowledge of the variety and number of things in the universe. In middle school students pay increasing attention to matters of scale and backup their understanding of the universe with activities using a variety of astronomical tools, generating accurate scale models, and describing the motion of celestial objects.

As students consider phenomena that play a role in sculpting the surface of the Earth, students become aware that Earth has changed over time and continues to change. In the early grades students observe ways in which organisms, themselves included, modify their surroundings. As people have used Earth resources, they have altered some Earth systems. Students can gradually come to recognize how human behavior affects the Earth's capacity to sustain life. Students investigate both short and long-term effects of erosion and weathering by wind and water and the rapid, dramatic changes caused by phenomena such as Earthquakes, volcanoes, floods, tornados, or hurricanes. In the middle grades students move toward a more complex understanding of weather and climate as they relate changes in the Earth's crust, the cycling of water in and out of the Earth's atmosphere and heat energy carried by ocean waters to climatic patterns around the world.

In their study of Earth, students over time develop an integrated picture of the planet and galaxy they inhabit. The full picture requires introduction of such concepts as temperature, the water cycle, gravitation, states of matter, chemical concentration, and energy transfer. These concepts are developed slowly as students mature and encounter them in different contexts. Even before children begin their formal education, they study Earth/Space science through observations of the changes that occur in the world around them. Early instructional activities build on students' prior knowledge and help them focus their observations. This enables students to discover distinguishing properties of Earth materials and celestial objects, patterns in movements, and cycles in the changes they observe. In the early years students focus on Earth's materials—soil, water, and rock and how these materials are continually changing. They also study components of weather and discover weather patterns. In the intermediate grades, students begin to build inventories of Earth's surface features, and to explain Earth's relationship to the sun, the moon, and other planets in its galaxy.

In middle school, students can consolidate their prior knowledge of the Earth (as a planet) by adding more details (especially about climate), getting a firmer grasp of the geometry involved in explaining the seasons and phases of the moon, improving their ability to handle scale, and shifting their frame of reference away from the Earth when needed. They understand gravity as a force acting toward the center of a spherical Earth and reaching indefinitely into space. They explore the cause of seasons as a subtle combination of global and orbital geometry and of the effects of radiation at different angles and they begin to look at the role of planet Earth in sustaining life.